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*Indian Standard*

# GLOSSARY OF TERMS RELATING TO ALUMINIUM AND ALUMINIUM ALLOYS

## PART 1 UNWROUGHT AND WROUGHT METALS

*( Second Revision )*

UDC 669·715 : 001·4



BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*June* 1987

Gr 4

# *Indian Standard*

# GLOSSARY OF TERMS RELATING TO ALUMINIUM AND ALUMINIUM ALLOYS

## PART 1 UNWROUGHT AND WROUGHT METALS

## *( Second Revision )*

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# *Indian Standard*

# GLOSSARY OF TERMS RELATING TO ALUMINIUM AND ALUMINIUM ALLOYS

## PART 1 UNWROUGHT AND WROUGHT METALS

## *( Second Revision )*

## 0. FOREWORD

**0.1** This Indian Standard ( Part 1 ) ( Second Revision ) was adopted by the Indian Standards Institution on 25 November 1986, after the draft finalized by the Light Metals and Their Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard ( Part 1 ) was originally published in 1969 and subsequently revised in 1979. In this revision the definitions of several terms have been modified and some more terms commonly used in aluminium industry have been included.

**0.3** Glossary of terms relating to aluminium and aluminium alloys have been divided in three parts covering different subjects in a logical sequence. This standard dealing with unwrought and wrought metals ( main and special types ) forms Part 1 of the series. The other parts in the series are as follows:

Part 2 Plant and operations, thermal treatment, control and testing, finishing

Part 3 Geometrical properties and tolerance, structural and surface defects

**0.4** This standard is intended mainly to cover technical definitions of terms relating to aluminium and aluminium alloys and it does not necessarily include all the legal meanings of the terms. It is hoped that this standard will help in establishing a general recognized usage for various terms encountered in the aluminium industry and eliminate any confusion which may sometimes arise due to individual interpretation of terms used in industry.

**0.5** In the preparation of this standard, assistance has been derived from the following publications:

BS 3660 : 1976 Glossary of terms for aluminium and aluminium alloys. British Standards Institution.

Nomenclature for aluminium mill products. The aluminium Association of USA.

## 1. SCOPE

**1.1** This standard ( Part 1 ) defines commonly used terms relating to unwrought aluminium and both main and special types of wrought aluminium.

## 2. TERMS AND DEFINITIONS

**2.1 Unwrought Metal** — A metal in any cast form meant for further processing.

**2.1.1** *Primary or Virgin Aluminium* — Aluminium obtained by reduction of alumina by electric smelting or reduction furnace and not subjected to any fabrication other than casting into pigs or ingots for remelting, redraw rod, rolling slabs, extrusion billets, wire bars, forging stock, etc. It may incorporate suitably, identified uncontaminated scrap from producer's own primary production operations.

**2.1.2** *Secondary Aluminium* — Aluminium which has been recovered from scrap by remelting.

**2.1.3** *Aluminium Alloy* — An alloy based on aluminium to which other elements are added to bring about an improvement in mechanical, physical and/or chemical properties to meet particular end uses.

**2.1.4** *Ingot* — A cast solid product of specific size, shape and chemical composition of metal or alloy intended for remelting.

**2.1.5** *Pig* — Primary metal cast direct from the reduction cell or through melting and/or holding furnace.

**2.1.6** *Notch Bar* — An ingot notched to facilitate breaking to small pieces for controlled additions.

**2.1.7** *Redraw Rod* — Coiled rod of quality suitable for drawing into wire.

**2.1.8** *Wire Rod* — Same as 'Redraw rod' ( *see* **2.1.7** ).

**2.1.9** *Slab* ( *Rolling Ingot Block* ) — A solid rectangular casting used for rolling into plate, sheet, strip and foil.

**2.1.10** *Billet* — A cylindrical or rectangular casting used for subsequent working.

**2.1.10.1** *Solid billet* — A solid cylindrical or rectangular casting used for subsequent working.

**2.1.10.2** *Hollow billet* — A billet cast with a central longitudinal hole.

**2.1.10.3** *Bored billet* — A billet with a central longitudinal hole produced by machining.

**2.1.11** *Cast Bar* — A solid rectangular casting that is long in relation to its cross section and whose width or greatest distance between parallel faces is greater than 6 mm.

**2.1.12** *Wirebar* — A cast square or circular or any other regular section used for the production of hot rolled rod and ultimately wire.

**2.1.13** *Cast Forging Stock* — A solid casting of circular or polygonal cross-section used for subsequent forging.

**2.1.14** *Castings* — Metallic shapes formed by pouring molten metal into a mould.

**2.1.15** *Aluminium Shot and Pellets* — Metals in the form of small spherical or nearly spherical pellets, usually made by causing molten metal to fall drop-wise from a suitable height in a quenching medium.

## 2.2 Wrought Metal — Main Type

**2.2.1** *Wrought Metal* — A metal which has been subjected to mechanical working by such processes as rolling, extrusion, forging, etc.

**2.2.2** *Plate* — Hot or cold rolled product of rectangular section, 6·0 mm thick or thicker. It may be either in straight length or in coil form. It has less control of surface finish and tolerance than applied to sheet.

**2.2.3** *Forged Plate* — Plate produced by forging.

**2.2.4** *Sheet/Strip* — Hot or cold rolled product of rectangular section, over 0·15 mm but less than 6·00 mm thick. It may be either in straight length or in coil form.

**2.2.5** *Rerolling Stock* — A semi-finished product of rectangular section suitable for further rolling. It may be either in straight length or in coil form.

**2.2.6** *Foil Stock* — Semi-finished coiled sheet for further rolling to foil.

**2.2.7** *Coil* — A wound continuous length of any material.

**2.2.8** *Foil* — A cold rolled product of rectangular section of a thickness not greater than 0·15 mm.

**2.2.8.1** *Printed foil* — Foil printed with a design or all over colour.

**2.2.8.2** *Laminated foil* — Foil backed with some other material.

**2.2.9** *Tube* — A hollow wrought product that is long in relation to its cross section, which is round, a regular hexagon, a regular octagon, elliptcal, or square or rectangular with sharp or rounded corners, and that has uniform wall thickness except as affected by corner radii.

**2.2.9.1** *Drawn tube* — A hollow product of uniform wall thickness produced by cold drawing from tube bloom.

**2.2.9.2** *Extruded tube* — A hollow extrusion of uniform wall thickness not subjected to cold drawing.

**2.2.9.3** *Welded tube* — Tube formed from plate or sheet by welding the abutting edges.

**2.2.9.4** *Pipe* — A tube with circular cross section.

**2.2.10** *Tube Bloom/Tube Shell/Tube Stock* — A hollow wrought section of uniform wall thickness used for the production of drawn tube.

**2.2.11** *Extruded Shapes and Sections* — Any shape or section of any size, hollow, solid produced by extrusion process.

**2.2.12** *Hollow Section* — An extruded shape, other than tube, the cross section of which completely encloses a void or voids.

**2.2.13** *Regular Solid Section* — A solid rolled, drawn or extruded section other than round, polygonal or rectangular which can be conveniently divided into approximate rectangles with measurable dimensions, for example, angles, channels, tees, etc.

**2.2.14** *Irregular Solid Section* — A solid rolled, drawn or extruded section the profile of which cannot be divided readily into approximate rectangles of measurable dimensions.

**2.2.15** *Bar* — Any solid section other than round that is long in relation to cross section and whose width or greatest distance betweed parallel faces is greater than 6 mm.

**2.2.15.1** *Extruded bar* — Bar brought to final dimensions by extruding.

**2.2.15.2** *Cold finished bar* — Bar brought to final dimensions by cold working to obtain improved surface finish and dimensional tolerances.

**2.2.15.3** *Rolled bar* — Bar brought to final dimensions by rolling.

**2.2.16** *Rod* — A round solid section which is long in relation to cross-section having a diameter greater than 6 mm.

**2.2.16.1** *Extruded rod* — Rod produced by extrusion process.

**2.2.16.2** *Rolled rod* — Rod produced by rolling process.

**2.2.16.3** *Cold Finished Rod* — Rod brought to final dimensions by cold working to obtain improved surface finish and dimensional tolerance.

**2.2.16.4** *Cold heading rod* — Rod of a quality suitable for use in the manufacture of cold headed products such as rivets and bolts.

**2.2.16.5** *Alclad rod* — Rod having on its surface a metallurgically bonded aluminium of aluminium alloy coating that is anodic to the core alloy to which it is bonded, thus electrolytically protecting the core alloy against corrosion.

**2.2.17** *Wire* — A round, square or regular polygonal solid section of 6 mm and below diameter or width across flats and usually supplied in coil form.

**2.2.17.1** *Cold heading wire* — Wire of quality suitable for use in the manufacture of cold headed products such as rivets and bolts.

**2.2.17.2** *Flattened wire* — A solid section having two parallel flat surfaces and round edges produced by roll flattening round wire.

**2.2.17.3** *Alclad wire* — Wire having on its surface a metallurgically bonded aluminium or aluminium alloy coating that is anodic to the core alloy to which it is bonded this electrolytically protecting the core alloy against corrosion.

**2.2.18** *Clad Material* — Aluminium which has a thin layer of aluminium or aluminium alloy metallurgically bonded to it an early stage in fabrication.

**2.2.19** *Forging* — A shape produced by hammering, upsetting or pressing usually when hot.

**2.2.20** *Hand Forging* — A forging produced by manipulating metal between open dies by repeated strokes or blows.

**2.2.21** *Press Forging* — A hand forging produced on a mechanical or hydraulic press by repeated applications of sustained pressure.

**2.2.22** *Drop Forging* — A die forging produced between a stationary bottom die and free falling weighted top die.

**2.2.23** *Hammer Forging* — A hand forging produced by the sharp repetitive blows of a steam or pneumatic hammer.

**2.2.24** *Drop Stamping* — A drop forging produced between closed dies.

**2.2.25** *Pressing* — A shape produced between closed dies on a hydraulic or mechanical press.

**2.2.26** *Upset Forging* — A forging having part or all of its cross section greater than that of the stock.

**2.2.27** *Forging Stock* — Cast, extruded or rolled material for the production of forgings.

## 2.3 Wrought Metal — Special Types

**2.3.1** *Tread Plate/Chequer Plate* — Plate upon which a raised or indented non-slip pattern has been impressed by rolling.

**2.3.2** *Grey Plate/Grey Sheet* — Rolled material having a dull matt finish on one or both faces.

**2.3.3** *Blank* — A piece of plate or sheet prepared for subsequent fabrication by forming, bending, cupping, drawing, impact extrusion pressing, etc.

**2.3.4** *Slug* — A solid or pierced blank used for impact extrusion forging.

**2.3.5** *Circle* — A blank which is circular in shape.

**2.3.6** *Oval Blank* — A blank which is oval in shape.

**2.3.7** *Ring* — A circle or disc from the centre of which a concentric area has been removed.

**2.3.8** *Brazing Sheet* — Sheet clad on one or both faces with an alloy of lower melting range than the core material for use in furnace or dip brazing.

**2.3.9** *Reflector Sheet* — Rolled material with characteristics which make it specially suitable for the manufacture of reflectors.

**2.3.10** *Satin-Finish Sheet* — Sheet having a fine scratch-brushed finish on one or both surfaces.

**2.3.11** *Deep Drawing Sheet* — Specially produced material with characteristics which make it suitable for deep drawing.

**2.3.12** *Corrugated Sheet* — Formed sheet with symmetrical, near sinusoidal profile.

**2.3.13** *Troughed Corrugated Sheet* — Formed sheet or asymmetrical/symmetrical profile with wide truncated vee troughs.

**2.3.14** *Embossed Sheet* — Patterned sheet where the indentations on the face appear as raised pattern on the opposite face.

**2.3.15** *Patterned Sheet* — Sheet on which a raised or indented pattern has been impressed on either one or both faces.

**2.3.16** *Roll-Welded Sheet* — A composite or two sheets pressure welded together during rolling except at predetermined areas, and subsequently inflated to form a labyrinth of passage ways.

**2.3.17** *Cable Wrap* — A cold rolled laminated or coated product of rectangular section suitable for cable rapping, supplied in coil form.

**2.3.18** *Anodizing Quality Material* — Material produced with characteristics which make it specially suitable for decorative anodizing.

**2.3.19** *Venetian Blind Sheet* — Thin gauge sheet specially produced with characteristics which make it suitable for the manufacture of venetian blind slats.

**2.3.20** *Formed Section* — Section produced from sheet by forming, roll forming, drawing or a combination of these processes.

**2.3.21** *Split Tube* — Tube formed from sheet with an open seam.

**2.3.22** *Seamed Tube* — Tube formed from sheet, the seam being mechanically locked.

**2.3.23** *Seamless Tube* — Tube which does not contain any line junctures resulting from the method of manufacture.

**2.3.24** *Shaped Tube* — Tube of a shape other than sound.

**2.3.25** *Cable Sheathing* — Extruded tube intended for sheathing electrical cable.

**2.3.26** *Conduit Tube* — Drawn, extruded or welded tube intended for encasing insulating electrical wiring.

**2.3.27** *Scaffold Tube* — Tube of dimensions and strength suitable for scaffolding.

**2.3.28** *Stepped Extrusion* — An extrusion having one or more abrupt changes in cross-section.

**2.3.29** *Tapered Extrusion* — An extrusion tapering continuously along its length.

**2.3.30** *Forging Bar* — Extruded or rolled bar for the production of forging.

**2.3.31** *Rivet Stock* — Round bar or wire suitable for the manufacture of rivets.

**2.3.32** *Bolt Stock* — Round bar or wire suitable for manufacture of bolts by cold heading.

**2.3.33** *Screw Stock* — Round bar or wire suitable for the manufacture of screws by cold heading.

**2.3.34** *Busbars* — Hollow solid section for use as a common junction between electrical circuits.

**2.3.35** *Conductor Wire* — Wire possessing the requisite electrical and mechanical properties for use as an electrical conductor.

**2.3.36** *Welding Wire* — Wire of suitable composition for use as filler material in fusion welding.

**2.3.37** *Welding Rod* — A rolled, extruded or cast round filler metal for use in joining by welding.

**2.3.38** *Consumable Electrode Welding Wire* — Wire of special surface quality, precision wound on to reels for use in the inert gas metal arc welding process.

**2.3.39** *Brazing Alloy Wire* — Alloy wire with a low melting range ( for example, 550-575°C ) for use as filler metal in brazing.

**2.3.40** *Brazing Alloy Rod* — A rolled, extruded or cast round filler metal for use in joining by brazing.

**2.3.41** *Spraying Wire* — Wire used in metal spraying.

**2.3.42** *Profile Wire* — A solid section, other than round square, or regular polygonal, of 6 mm maximum dimension, produced by a wire drawing process. Typical sections are pinion, serrated, half-round and triangular.

**2.3.43** *Slide Fastener Wire* — Round or rectangular alloy wire of suitable quality and of the strength required for slide fasteners.

**2.3.44** *Knitting Needle Wire* — Alloy wire having adequate strength combined with surface quality for the manufacture of knitting needles and subsequent anodic oxidation.

**2.3.45** *Fin Stock* — Coiled sheet or foil in specific alloys, tempers and thickness ranges suitable for manufacture of fins for heat exchanger applications.

**2.3.46** *Fluted Tube* — A tube of nominally uniform wall thickness having regular, longitudinal concave corrugations with sharp cusps between corrugations.

**2.3.47** *Lithographic Sheet* — Sheet having a superior finish on one side with respect to freedom from surface imperfections and supplied with a maximum degree of flatness for use as a plate in offset printing.

**2.3.48** *Flashless Forging* — A forging produced within totally enclosed dies which preclude the exudation of excess metal between the parting faces of the dies.

**2.3.49** *Close-to-Form Stamping* — A drop stamping of such dimensional accuracy that subsequent machining is eliminated or reduced to a minimum.

**2.3.50** *Forged Ring* — A ring of regular cross-section produced either by trunnioning or rolling, which results in the principal direction of grain flow being circumferential ( that is, concentric with the ring).

**2.3.51** *Sintered Aluminium Powder Product* — A wrought product made from fine oxidized aluminium powder by compacting, sintering, hot pressing or subsequent working.

# INDEX

NOTE — This index has been prepared in accordance with IS : 1275-1958*. Index numbers are clause numbers.



*Rules for making alphabetical indexes.

# INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

**Base Units**

| Quantity | Unit | Symbol |
|---|---|---|
| Length | metre | m |
| Mass | kilogram | kg |
| Time | second | s |
| Electric current | ampere | A |
| Thermodynamic temperature | kelvin | K |
| Luminous intensity | candela | cd |
| Amount of substance | mole | mol |

**Supplementary Units**

| Quantity | Unit | Symbol |
|---|---|---|
| Plane angle | radian | rad |
| Solid angle | steradian | sr |

**Derived Units**

| Quantity | Unit | Symbol | Definition |
|---|---|---|---|
| Force | newton | N | 1 N = 1 kg.m/s$^2$ |
| Energy | joule | J | 1 J = 1 N.m |
| Power | watt | W | 1 W = 1 J/s |
| Flux | weber | Wb | 1 Wb = 1 V.s |
| Flux density | tesla | T | 1 T = 1 Wb/m$^2$ |
| Frequency | hertz | Hz | 1 Hz = 1 c/s (s$^{-1}$) |
| Electric conductance | siemens | S | 1 S = 1 A/V |
| Electromotive force | volt | V | 1 V = 1 W/A |
| Pressure, stress | pascal | Pa | 1 Pa = 1 N/m$^2$ |

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